



New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **CADMIUM OXIDE**

CAS Number: 1306-19-0
DOT Number: UN 2570

RTK Substance number: 2200
Date: September 1998

HAZARD SUMMARY

- * **Cadmium Oxide** can affect you when breathed in.
- * **Cadmium Oxide** is a **CARCINOGEN**--HANDLE WITH EXTREME CAUTION.
- * **Cadmium Oxide** can irritate the eyes on contact.
- * Breathing **Cadmium Oxide** can irritate the nose and throat.
- * Breathing **Cadmium Oxide** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- * **Cadmium Oxide** can cause a flu-like illness with chills, headache, aching, a metallic taste, and/or fever (called "metal fume fever").
- * Exposure to **Cadmium Oxide** can cause nausea, salivation, vomiting, cramps and diarrhea.
- * Repeated exposure to **Cadmium Oxide** can cause permanent kidney damage which can lead to kidney stones.
- * **Cadmium Oxide** may damage the liver.

IDENTIFICATION

Cadmium Oxide is a dark brown powder or odorless substance. It is used in electroplating semiconductors, metal alloys, and batteries, as a catalyst and intermediate, as a vermicide, and in the making of glass.

REASON FOR CITATION

- * **Cadmium Oxide** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, NTP, DEP, IARC and EPA.
- * This chemical is on the Special Health Hazard Substance List because it is a **CARCINOGEN**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you

WORKPLACE EXPOSURE LIMITS

The following exposure limits are for **Cadmium Oxide** (measured as *Cadmium*):

- OSHA: The legal airborne permissible exposure limit (PEL) is **0.005 mg/m³** averaged over an 8-hour workshift.
- NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.
- ACGIH: The recommended airborne exposure limit is **0.01 mg/m³** for inhalable dust and **0.002 mg/m³** for respirable dust averaged over an 8-hour workshift.

- * **Cadmium Oxide** is a **PROBABLE CARCINOGEN** in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

WAYS OF REDUCING EXPOSURE

- * Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * A regulated, marked area should be established where **Cadmium Oxide** is handled, used, or stored as required by the OSHA Standard: 29 CFR 1910.1027.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to **Cadmium Oxide** and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Cadmium Oxide** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Metal, metal compounds and alloys are often used in “hot” operations in the workplace. These may include, but are not limited to, welding, brazing, soldering, plating, cutting, and metallizing. At the high temperatures reached in these operations, metals often form metal fumes which have different health effects and exposure standards than the original metal or metal compound and require specialized controls. Your workplace can be evaluated for the presence of particular fumes which may be generated. Consult the appropriate New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheets.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Cadmium Oxide**:

- * **Cadmium Oxide** can irritate the eyes on contact.
- * Breathing **Cadmium Oxide** can irritate the nose and throat.
- * Breathing **Cadmium Oxide** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- * **Cadmium Oxide** can cause a flu-like illness with chills, headache, aching, metallic taste and/or fever (called “metal fume fever”).
- * Exposure to **Cadmium Oxide** can cause nausea, salivation, vomiting, cramps and diarrhea.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Cadmium Oxide** and can last for months or years:

Cancer Hazard

- * **Cadmium Oxide** is a PROBABLE CARCINOGEN in humans. There is some evidence that it causes lung and prostate cancer in humans and it has been shown to cause lung cancer in animals.
- * Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

- * There is limited evidence that **Cadmium Oxide** is a teratogen in animals. Until further testing has been done, it should be treated as a possible teratogen in humans.

Other Long-Term Effects

- * Repeated exposure to **Cadmium Oxide** can cause permanent kidney damage which can lead to kidney stones.
- * **Cadmium Oxide** may damage the liver.
- * Long term exposure can cause anemia, brittle and painful bones, loss of sense of smell, fatigue, and/or yellow staining of teeth.
- * **Cadmium Oxide** can irritate the lungs. Repeated exposure may cause bronchitis to develop with cough, phlegm, and/or shortness of breath.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

- * Urine test for *Cadmium* (levels should be less than **10 micrograms per liter** of urine).
- * Urine test for “low molecular weight proteins” (Beta-2-microglobulin) to detect kidney damage.
- * Urinalysis (UA).
- * Complete blood count (CBC).
- * Lung function tests.

If symptoms develop or overexposure is suspected, the following is recommended:

- * Consider chest x-ray after acute overexposure.
- * Liver function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

- * Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically transfer **Cadmium Oxide** from drums or other storage containers to process containers.
- * Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA Standard: 29 CFR 1910.1027.
- * A Class I, Type B, biological safety hood should be used when mixing, handling, or preparing **Cadmium Oxide**.
- * Work surfaces should be cleaned thoroughly on a routine basis.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by **Cadmium Oxide** should change into clean clothing promptly.
- * Do not take contaminated work clothes home. Family members could be exposed.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Cadmium Oxide**.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with **Cadmium Oxide**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Cadmium Oxide**, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where **Cadmium Oxide** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.
- * Use a vacuum or a wet method to reduce dust during clean-up. **DO NOT DRY SWEEP**.
- * When vacuuming, a high efficiency particulate air (HEPA) filter should be used, not a standard shop vacuum.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with **Cadmium Oxide**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- * Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
- * Contact lenses should not be worn when working with this substance.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS.

Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * NIOSH has established new testing and certification requirements for negative pressure, air purifying, particulate filter and filtering facepiece respirators. The filter classifications of dust/mist/fume, paint spray or pesticide prefilters, and filters for radon daughters, have been replaced with the N, R, and P series. Each series has three levels of filtering efficiency: 95%, 99%, and 99.9%. Check with your safety equipment supplier or your respirator manufacturer to determine which respirator is appropriate for your facility.
- * If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Cadmium Oxide**, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- * Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.

- * Where the potential exists for exposure over **0.002 mg/m³** of *respirable Cadmium*, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- * Exposure to **9 mg/m³** (as *Cadmium*) is immediately dangerous to life and health. If the possibility of exposure above **9 mg/m³** (as *Cadmium*) exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.
- Q: Don't all chemicals cause cancer?
- A: No. Most chemicals tested by scientists are not cancer-causing.

- Q: Should I be concerned if a chemical causes cancer in animals?
- A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.
- Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?
- A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.
- Q: Should I be concerned if a chemical is a teratogen in animals?
- A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

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The New Jersey Department of Health and Senior Services, Occupational Disease and Injury Services, offers multiple services in occupational health. These include: Right to Know Information Resources, Public Presentations, General References, Industrial Hygiene Information, Surveys and Investigations, and Medical Evaluation. Consult another Fact Sheet for a more detailed description of these services or call (609) 984-2202.

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DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

HANDLING AND STORAGE

- * Prior to working with **Cadmium Oxide** you should be trained on its proper handling and storage.
- * A regulated, marked area should be established where **Cadmium Oxide** is handled, used, or stored.
- * **Cadmium Oxide** must be stored to avoid contact with MAGNESIUM since violent reactions occur.
- * **Cadmium Oxide** is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFUR; SELENIUM; and TELLURIUM.
- * Store in tightly closed containers in a cool, well-ventilated area away from HEAT, MOISTURE and ACIDS.

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

- ## Eye Contact

- * Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

- * Remove contaminated clothing. Wash contaminated skin with soap and water.

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.
- * Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Vapor Pressure: 0 mm Hg at 68°F (20°C)

Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:

Cadmium Oxide

Other Names:

Cadmium Fume; Cadmium Monoxide

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

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NEW JERSEY DEPARTMENT OF HEALTH AND
SENIOR SERVICES

Right to Know Program

PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202